

A REPORT ON A HERPETOLOGICAL SURVEY OF THE SRIVILLIPUTTUR RESERVE FOREST, TAMIL NADU¹

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(With a text-figure)

The reptiles and amphibians found during a six-week survey of the Srivilliputtur Reserve Forest in July and August 1987 are described. The failure of the monsoon rains created unfavourable conditions and specimen numbers were low. The report is therefore largely anecdotal. Some observations on the breeding behaviour of the frogs *Ramanella triangularis* and *Micrixalus fuscus* are described.

INTRODUCTION

The Srivilliputtur Reserve Forest is situated 40 km south of Madurai, in Tamil Nadu, south India. Its south-western boundary abuts the Periyar Wildlife Sanctuary in Kerala. There has been considerable interest among conservation-oriented bodies within India in creating a wildlife sanctuary in Tamil Nadu which would include the Srivilliputtur Reserve Forest (Johnsingh 1984).

Dry deciduous forests cover the eastern and lower altitude slopes, and are inhabited by the last remaining breeding population of the Indian giant grizzled squirrel *Ratufa m. macroura*. The higher valleys and peaks to the west, which receive higher rainfall, have moist deciduous and moist evergreen forests. However, the fauna of this, more inaccessible, part of the Reserve Forest is not well known. This survey was carried out at the invitation of the Wildlife Association of Ramnad District (WARD), and took place during the period 19 July to 22 August 1987. It was almost entirely confined to the central part of the Reserve Forest (i.e. to moist shola forest between 1060-1690 m) and areas of grassland and scrub adjoining the forest at higher altitudes.

Other objectives of the project included recording amphibian breeding calls, and an attempt to relocate the rare endemic frog *Melanobatrachus indicus* (Beddome), not seen since its original collection in 1898. Our time in the field was planned to commence after the onset of the south-west monsoons. Although Srivilliputtur receives the major part of its annual rainfall from the north-east monsoon (October-November), it also receives heavy rain from the south-west monsoon (May-June), and thus conditions were expected to be moist and well suited to our project. However, in 1987 the south-west monsoon failed almost completely in most of the Indian subcontinent. We were therefore only successful in recording the calls of three species of frogs: *Ramanella triangularis*, *Micrixalus fuscus*, and *Rana beddomii*. Details of these species are presented later. The first two recordings are breeding calls, and the last (this species was not breeding at the time) is an alarm call.

The recordings have been deposited with The British Library of Wildlife Sounds (BLOWS), 29, Exhibition Road, London SW7 2AS. *Melanobatrachus indicus* was not found. However, checklists of birds, butterflies, and mammals encountered in the field were also prepared and are reported elsewhere (Malhotra *et al.* 1988). Because of the low rainfall, specimen numbers were low, and hence this report is largely anecdotal. It is hoped that this will nevertheless contribute something of significance to herpetological knowledge in India.

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MATERIAL AND METHODS

We intended to use a number of methods, including active searching, and a variety of traps [e.g. pitfall traps, pipe traps, (Lohofner and Wolfe 1984) and drift fences]. However, we had only one pipe trap in the field, and it did not prove to be very successful. It is difficult to say whether this was attributable to a design fault or the reduced activity and low density of forest floor inhabitants. In general, traps of this type have low capture rates and are most fruitful if left over as long a period of time as possible. They have to be checked regularly and this can limit the sites available. Our trap was eventually damaged by a larger animal (possibly a wild boar *Sus scrofa*) which tore up the drift fence.

Systematic quadrat searching was abandoned after some initial experimentation: it was felt that because of the low density of amphibians and reptiles we would do better to concentrate on active searching, whereby we could focus on many different habitats while covering larger areas.

Our methodology involved close visual inspection of trees and shrubs up to a height of 4-5 m, a careful search of the ground, turning over litter, stones and rocks, and digging where possible. Detailed notes were made at the time of capture for each specimen: position (location and microhabitat) and behavioural notes, snout-vent lengths, tail lengths and scale counts where appropriate, and details of coloration (backed up in most cases by photographs). Only if there were any difficulties with identification, or if the specimen was of particular interest for other reasons, was it killed and preserved for examination at the Bombay Natural History Society. The conditions under which we had been granted permission did not allow for the collection of a comprehensive series of the species found, and as the emphasis of this project was very much on conservation, collection of specimens was kept to a minimum.

Sandoz MS222 (at a dilution of 1:500) was

used to kill amphibians. Small (under 5 cm SVL) frogs and toads are simply dropped in, and quickly succumb. The best method is to use a screwtop jar filled almost to the brim to limit their ability to gulp air. In the case of reptiles, a solution of Nembutal was administered orally with a small paintbrush. All specimens were labelled with numbered tags, and the relevant information (date and time of capture, elevation, position, habitat, details of coloration in life) was recorded in a field notebook against that number. Amphibians were preserved in 1:16, and reptiles in 1:10 formalin solution. Some of the specimens collected are deposited with the Bombay Natural History Society.

RESULTS

The measurements given refer to snout-vent lengths, and for snakes and lizards, the length of the tail is given in brackets. The following abbreviations are also used: F=Female. Juv.=Juvenile. It did not prove possible to sex the specimens in all cases, so this data is only given where known.

SERPENTES

Family: UROPELTIDAE

Uropeltis ceylanicus Cuvier

Number of specimens found: 2. Size: 57, 210 mm. Altitudinal range: 1060-1290 m. Habitat: shola. Microhabitat: both specimens were dug from at least 15 cm below the soil surface.

The head and tail of this species are very similar in appearance, both being wedge-shaped and having a lateral yellow stripe. The smaller specimen assumed a tightly coiled position, with the head underneath the coils and the tail protruding from the top. This is probably a predator avoidance strategy.

Family: COLUBRIDAE

Oligodon venustus (Jerdon)

Number of specimens found: 2. Size: no data. Altitudinal range: 1290 m. Habitat: shola.

Microhabitat: both found crossing a path through the shola.

These snakes were very vicious in disposition and delivered painful bites with their long posterior maxillary teeth. Their lack of a distinct neck, and their loose skin, made them difficult to restrain. They also employed a 'stabbing' motion of the tail, which seemed to have a conical, sharp-tipped terminal scute.

Liopeltis calamaria (Gunther)

Number of specimens found: 3. Size: 122-270 mm, mean 190.7 mm. Altitudinal range: 1290-1690 m. Habitat: grassland. Microhabitat: two specimens were found under rocks, one was caught while basking on a rock in the early morning.

A gentle and inoffensive snake.

Ahaetulla nasutus (Lacepede)

Number of specimens found: 7. Size: 482-695 mm, mean 611.4 mm (one specimen sighted, estimated total length 1000 mm). Altitudinal range: 1060-1290 m. Habitat: scrub (4 specimens) and shola (3 specimens). Microhabitat: all found in small trees or in the top fronds of *Phoenix* bushes.

Most of the specimens were caught while basking in the early hours of the morning. Some were aggressive when caught and the larger ones were capable of giving fairly painful bites. Others were docile.

Elaphe helena (Daudin)

Number of specimens found: 1. Size: 475 mm. Altitudinal range: 1290 m. Habitat: grassy ridge near the edge of shola. Microhabitat: in tall grass.

A very docile snake. Caught while basking in the early morning.

Dendrelaphis bifrenalis (Boulenger)

Number of specimens found: 1. Size: 495 mm. Altitudinal range: 1150 m. Habitat: scrub/shola boundary. Microhabitat: on ground

near the waterhole.

A very docile snake. It was in the process of catching a frog near the waterhole (possibly *Rana beddomii*) when it was disturbed.

Dendrelaphis grundoculis (Boulenger)

Number of specimens found: 1. Size: no data. Altitudinal range: 1290 m. Habitat: shola. Microhabitat: was in leaf litter when caught, but had just jumped down from a small tree.

This snake had an aggressive display involving inflating the anterior part of its body, exposing the pale blue interscalar skin, and extending its bright blue tongue to its full length. However it made no attempt to strike. There was also a prominent yellow patch on its throat.

Sibynophis subpunctatus (Dumeril & Bibron)

Number of specimens found: 1. Size: 225 mm. Altitudinal range: 180 m. Habitat: dry deciduous. Microhabitat: found crossing a sandy path near a village.

A quick, alert snake, making rapid darting movements with its head. Its locomotion, as it crossed the hot sunlit path, was somewhat reminiscent of sidewinding.

Amphiesma beddomei (Gunther)

Number of specimens found: 7 adults, 2 juv. Size 129(40)-450(145) mm, mean adult size 362 mm. Altitudinal range: 1060 m. Habitat: scrub, shola. Microhabitat: 4 specimens were found by the edge of streams, the others were not near any water. One was dug out from beneath a rock.

All were gentle and inoffensive snakes. The coloration of eight of our specimens agreed well with the description in Smith (1943), varying in the amount of yellow visible, and in the distinctness of the parietal bar. However, one juvenile was completely different in coloration although it agreed well in other specific details, such as scalation. It was dark grey in colour dorsally and reddish brown ventrally. The same reddish

brown colour was present in two irregular patches on the head, a smaller one on the inter-nasals, and a larger one on the prefrontals and parietals. Bordering this posteriorly were two white bands, curving away from each other so that they did not meet on the midline. There were two dorsolateral rows of separated reddish-brown black-edged spots extending down the body and tail. In addition, the specimens varied in the number of supralabials, one individual (otherwise similar) having a different number on either side of its head.

Macropisthodon plumbicolor (Cantor)

Number of specimens found: 1(F). Size: 350 (60) mm. Altitudinal range: 1060 m. Habitat: shola. Microhabitat: among the roots of a tree near the campsite.

Made no attempt to strike. It was found at night at the base of a tree in which there was a tree pool containing several *Ramanella triangularis*.

Boiga ceylonensis (Gunther)

Number of specimens found: 1 juv. Size: 236 (65) mm. Altitudinal range: 1140 m. Habitat: shola. Microhabitat: in accumulated leaf litter in dry pool on stream bed.

This snake was found during the day in leaf litter, although this species is nocturnal and arboreal. It assumed an 'S' shaped defensive posture and struck several times, but on handling became docile.

Family: VIPERIDAE

Trimeresurus macrolepis Beddome

Number of specimens found: 1 adult, 1 juv. Size: 137(30), 215(50) mm. Altitudinal range: 1140-1515 m. Habitat: shola. Microhabitat: the adult specimen was found on a low bush near the path, and the juvenile was found in leaf litter.

It has been suggested that juvenile pit vipers of other species use the tips of their tails as 'bait' to attract prey. In this context the following observations are of interest. The tip of

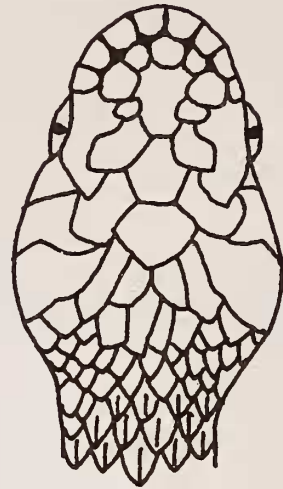


Fig. 1. Unusual head scalation of a juvenile *Trimeresurus macrolepis*. Note the extra-interorbital scales.

the tail in the juvenile specimen was greyish-white for about one-sixth of its length, and a further three-sixth was banded olive green and brown, and was thus visually distinct from the rest of the body which is bright green. It was observed to coil up with the tip of the tail protruding, and wriggled in a way that suggested worm imitation. The head scalation of this specimen differed considerably from Smith's description, having a number of extra scales (Fig. 1).

Trimeresurus malabaricus (Jerdon)

Number of specimens found: 2. Size: ?, 1050 mm. Altitudinal range: 1060-1210 m. Habitat: shola. Microhabitat: on branches of small trees/shrubs. One was 4 m and the other 1.3 m from the ground.

Both specimens were found during the day and were asleep. We did not disturb the one found closer to the ground, and it did not wake in spite of one of us accidentally brushing against the sapling on which it was sleeping.

In addition to the above specimens we also found the recently sloughed skins of two snakes. If in reasonable condition and state of completeness, it is possible to identify some snakes on the basis of sloughed skin. We were able to identify one of the skins as *Ptyas mucosus* (Linn.), the common rat snake. It was found in grassland, and was of a large diameter. It was estimated (by Chokkalingam, the Irula snake-

catcher who accompanied us), to have been shed four days previously. The second skin was not very complete, the head forward of the parietals being missing. However, the parts which remained were intriguing. Scales were in 21 rows, and the vertebral scales were hexagonal and strongly enlarged. The diameter was small. The condition of the vertebrae should allow the possibilities to be narrowed down considerably. However, we cannot find a species that has this combination of characters, which is known to occur in southern India. If anyone has any ideas on the identity of this snake, we will be very interested in hearing from them.

SAURIA

Family: GEKKONIDAE

Dravidogecko anamallensis (Gunther)

Number of specimens found: 2. Size: 37, 42 mm. Altitudinal range: 1060 m. Habitat: shola. Microhabitat: on tree trunks in the clearing.

Hemidactylus maculatus Dumeril & Bibron

Number of specimens found: 1. Size: 100 mm. Altitudinal range: 1150 m. Habitat: scrub. Microhabitat: on the outer wall of the Rest House.

The tail had been regenerated.

Cnemaspis kandiana (Kelaart)

Number of specimens found: many. Size: F, 33 (29) mm. Altitudinal range: 1150 m. Habitat: scrub/shola boundary. Microhabitat: on outer wall of Rest House.

Many of the females were gravid. The female whose measurements are given above had two eggs 5.8 mm long. The coloration agrees with Smith's description except that the head is yellowish. This was especially bright on the gular region and the rims of the eyes, and was present in both males and females.

Family: AGAMIDAE

Draco dussumieri Dumeril & Bibron

Number of specimens found: 1. Size: No

data. Altitudinal range: 1150 m. Habitat: scrub/shola boundary. Microhabitat: on the concrete wall surrounding the water hole.

Described as "entirely arboreal, never descending to the ground except for breeding purposes" (Murthy 1985). Possibly the unusual dryness of the season induced it to descend to the waterhole. Our first attempt to catch it resulted in its jumping down from the raised edge of the waterhole to the base of a tree, extending its side flaps very slightly. When released it took to the trees extremely rapidly.

Calotes versicolor (Daudin)

Number of specimens found: 1 M, 2 F, 2 juv., but many more sighted. Size: Juv. 66 (183), 70 (210) mm; F 90 (218), 80 (190) mm; M 115 (237) mm. Altitudinal range: 1060-1150 m. Habitat: scrub/shola. Microhabitat: the male was found in a prominent position on a tree trunk. The females and juveniles were all found near the ground, on rocks, bushes and tree trunks.

The sexes are very dimorphic. The male was seen regularly in the same one or two trees near the campsite. Both females were gravid. One of the juveniles had recently sloughed and its coloration was very intense and distinct.

Calotes grandisquamis Gunther

Number of specimens found: 4 M. Size: 108 (250)-147 (345) mm. Altitudinal range: 1060-1210 m. Habitat: shola. Microhabitat: two were found on the trunks of tall trees. One was basking in a small tree, and one was found drinking at the waterhole.

A very colourful lizard. One male, when first seen, had an intense orange-red gular region, but on capture this had faded to a faint orange flush as seen in the other specimens.

Psammodromus dorsalis (Gray)

Number of specimens found: 5 M, 1 F, 2 juv.; but many more seen, especially displaying males. Size: M 88-107 mm, mean 98 mm; F, no data; juv. 34(67), 41(86) mm. Altitudinal range:

1150-1515 m. Habitat: expanses of rock. Microhabitat: most found basking on rocks, or in the case of males, while displaying on rocks.

A very agile species, difficult to catch as they quickly retreat into rock crevices. The male display consists of push-ups and head bobs. They are extremely brightly coloured while displaying, having bright red check stripes and a yellow/orange stripe down the back. However, they quickly revert to a cryptic greyish mottled pattern on being disturbed.

Psammophilus blanfordanus (Stoliczka)

Number of specimens found: 3 M 2 F, 1 juv.; but many more seen. Size: M 74(135) mm; F 74, 82 mm. Altitudinal range: 1060-1290 m. Habitat: expanses of rock. Microhabitat: on or under slabs of rock.

The larger female was gravid.

Family: SCINCIDAE

Mabuya carinata (Schneider)

Number of specimens found: 3 M, 1 F; more seen but not caught. Size: M 62 (89)-110 (200) mm, mean 90.7 mm; F 62 (73) mm. Altitudinal range: 910-1150 m. Habitat: scrub, shola. Microhabitat: basking on rocks, or in leaf litter.

The males were in breeding colours: the flanks and the sides of the jaws were red or orange-red in colour.

Mabuya macularia (Blyth)

Number of specimens found: 1 M 2 F. Size: M 65 mm; F 62 (79), 70 (62) mm; mean 65.7 mm. Altitudinal range: 910-1150 m. Habitat: shola, scrub. Microhabitat: leaf litter.

The male was in breeding coloration: a salmon-pink tinge extending from the chin over the ventral surface to a line between the front legs; and extending to the rostral and the first two supralabials on the upper jaw. One of the females found corresponded in coloration to a form whose range is described by Smith (1943) as "Peninsular India north of 12 degrees north".

Leiolopisma travancoricum (Beddome)

Number of specimens found: 4 juv., 4 adults; many more seen. Size: Juv. 29(40) mm; Adults 50-57 (tails damaged), mean 54.75 mm. Altitudinal range: 1140-1290 m. Habitat: shola. Microhabitat: leaf litter, under stones or rotting logs, rocks on wet stream margins.

Juveniles had metallic blue tails. This colour is restricted in adults to a blue sheen on the ventral surface of the tail. The size of these skinks is somewhat larger than described by Smith (1943). They were very abundant in one particular site during the earlier part of our study period, but virtually disappeared later. For example, 16 specimens were recorded during a two-hour search of the forest on either side of the path to the stream on 3 August, yet on later occasions we found none at all. Another observation was that on our first few visits to this site, these skinks were extremely abundant on the rocks and banks of the stream, especially juveniles. However, on later occasions we rarely saw any juveniles here.

Riopa punctata (Gmelin)

Number of specimens found: 4 juv., 5 adults. Size: Juv. 45(52)-63(76) mm, mean 53.5 mm; Adults: 55(36)-62(65) mm, mean 64.75 mm. Altitudinal range: 1060-1290 m. Habitat: scrub, grassland. Microhabitat: under stones or in grass tussocks in which they had taken cover.

Juveniles were defined as those specimens still having traces of red on the tail. The smaller specimens had very intense orange-red tails, while the larger ones had a faint reddish tinge. The 'adults' had no trace of red at all. One of the specimens (Field No. 24/7/A), identified as being of this species by the BNHS, is aberrant in that it had no trace of red in spite of being smaller than some of the 'juveniles' found. It was also much darker than the others, and had a tail which was significantly shorter than its body, with no sign of damage. In his description of this species, Smith (1943) states that the tail

is longer than the body, and this was the case in all the other specimens found. It had a mid-body scale count of 28, which Smith states to be rare in this species. It was also the only specimen to be found in an area of scrub rather than in grassland.

Family: VARANIDAE

Varanus bengalensis (Schneider)

Number of specimens found: 1 juv., 3 adults sighted. Size: Juv. 113 (186) mm; adults: estimated total lengths up to 1000 mm. Altitudinal range: 1210-1820 m. Habitat: scrub, grassland. Microhabitat: the juvenile was found under a pile of rocks.

In addition to the specimens seen, we also found monitor droppings, containing egg shells, many insect remains (mostly legs), and some mammal hair. One of our party encountered an adult monitor at close range while taking photographs of birds. While foraging, it came right up to his feet and even licked his boots before retreating.

ANURA

Family: RANIDAE

Rana diplosticta (Gunther)

Number of specimens found: 7. Size: 17-27 mm, mean 20.16 mm. Altitudinal range: 1140-1515 m. Habitat: shola. Microhabitat: most were found in leaf litter in the immediate vicinity of water, but one was found under a rotten log, far from any streams.

The specimen found under a log had a somewhat flattened appearance and was very sluggish.

Rana temporalis (Gunther)

Number of specimens found: many. Size: 15-53 mm, mean 45.75 mm. Altitudinal range: 910-1140 m. Habitat: shola. Microhabitat: all were found in the vicinity of water.

This species was more common at lower elevations. They were present in large numbers in pools remaining in the rocky river beds. The

smallest specimen found had a tail about half its body length. Only a few were found at higher elevations.

Rana beddomii (Gunther)

Number of specimens found: many. Size: 14-43 mm, mean 28.4 mm. Altitudinal range: 1060-1515 m. Habitat: shola. Microhabitat: some were found near streams, others in leaf litter far from streams. One was found under a rotten log, one in a tree pool about 20 cm from the ground.

This was the commonest species present. They frequently squirted out the contents of the bladder when picked up. A small proportion were darker brown with a light vertebral stripe.

Micrixalus fuscus Boulenger

Number of specimens found: many. Size: 16-27 mm, mean 21 mm. Altitudinal range: 1140-1515 m. Habitat: shola. Microhabitat: always found near water, on rocks on the bank and in mid-stream.

A very variable species. Most specimens had a lighter V-shaped band on the dorsal surface. In one case a frog was seen with a bright yellow V-shaped band, but on being pursued, the colour faded to a light brown. Some males of this species were observed displaying in a seepage area of the stream (see below for details). The breeding call of this species was also recorded.

Nyctibatrachus major Boulenger

Number of specimens found: 8. Size: 21-41 mm, mean 33.3 mm. Altitudinal range: 1140-1515 m. Habitat: shola. Microhabitat: all found in water.

About five frogs were present in the same small pool off the main flow of the stream. They were lined up along the edge, clinging to the vertical sides of the pool with their heads just above water. They were not at all wary of being approached.

Nannobatrachus beddomii Boulenger

Number of specimens found: 3. Size: 10-15 mm. Altitudinal range: 1515 m. Habitat: shola.

Microhabitat: on the edge of the stream.

The smallest specimen had a tail 16 mm long, and the other two had vestiges of a tail. Two colour forms were present: a pale tan (one specimen), and a dark brown (exhibited by the other two specimens).

Family: RHACOPHORIDAE
Philautus variabilis (Gunther)

Number of specimens found: 7. Size : 17-19 mm, mean 18.2 mm. Altitudinal range: 1140-1515 m. Habitat: shola. Microhabitat: leaf litter, some near streams but others far from any bodies of water.

Almost all were pale fawn in colour when caught, but on being kept in a container with moisture, became much darker. They all had a turquoise tinge on the flanks and between the eyes, and the upper eyelid, when fully retracted, revealed a brilliant turquoise stripe above the eye. This, and other details of the coloration of our specimens, corresponds better with the description of *Philautus signatus* than of *P. variabilis* (Inger *et al.* 1984); however, the specimens were identified as the latter by the BNHS.

Family: BUFONIDAE
Bufo melanostictus Schneider

Number of specimens found: 1 F. Size: 105 mm. Altitudinal range: 1060 m. Habitat: grassland on the edge of the shola. Microhabitat: in tall grass.

It inflated itself when handled. It was found on a rainy day in the afternoon; this species is normally nocturnal except in the breeding season.

Family: MICROHYLIDAE
Ramanella triangularis (Gunther)

Number of specimens found: 6. Size: 22-26 mm, mean 24.2 mm. Altitudinal range: 1060-1140 m. Habitat: shola. Microhabitat: one was found under the bark of a log within a few metres of the edge of a stream, and the others were all found either in, or climbing up to a

small tree pool about 2.75 m from the ground.

The specimen found under bark of a log was very torpid, and much thinner than the active specimens found in the tree pool. This was within a few metres of our campsite, so we were able to make some observations of breeding behaviour. The breeding call of this species was recorded. An additional point of interest is that specimens seemed resistant to the anaesthetising action of MS222. A couple of specimens were left in the solution for a considerable time but showed no sign of succumbing. The same solution was subsequently used to dispatch specimens of other species, and proved to be effective for these.

Tadpoles: Several tadpoles were collected. These have been identified as follows: 1) *Nyctibatrachus* sp.: six, at different stages of development. The largest were almost fully metamorphosed but still retained a tail longer than body length. These were all collected from the same site, and several were taken from the same pool as the adult *Nyctibatrachus major* specimens. It would therefore seem likely that these tadpoles are *N. major*. 2) *Rana* sp.: one. 3) *Micrixalus* sp.: one, from river where adults of *M. fuscus* were abundant.

OBSERVATIONS ON BREEDING BEHAVIOUR

***Micrixalus fuscus*:** Frogs of this species were heard calling at several different sites along the Chittar river, but a display was only seen at one site, where it was observed on several different occasions. The display consisted of stretching a hind leg upwards and backwards, with the digits spread to display the pale blue interdigital webbing. The leg was held in this position for a short time and then lowered to the ground, and finally retracted to the normal position. On some occasions the leg was only extended backwards and not upwards. Males did not usually call while displaying, and several males were seen displaying at the same time. The display took place in a seepage area near the edge of the stream. One of the displaying males was caught

and examined, and the dorsal surface of its feet was much bluer in colour than other specimens examined. It had a well developed nuptial pad on the first digit of the foreleg.

Ramanella triangularis: These frogs were first heard calling in the evening of 27 July, after heavy rain the previous night. Three males were present, and one was collected. Calling was also heard the next night, but stopped after this for a week, during which it did not rain. Calling resumed after the next heavy rain (in the afternoon of 7 August). Males began calling soon after dusk (about 1900 hrs) and called for 1-2 hours; this appeared to be the general rule. On examination it was seen that there were now four frogs, all apparently male (at least three of them were observed to call). One of the males attempted to amplex another and was repelled. None of the males had visible nuptial pads. Later the same night another frog was found climbing towards the pool. It could not be positively identified as being female, but this can possibly be inferred from its larger size and the observation that on 9 August, a pair in axillary amplexus were observed in the pool. (There was no activity on 8 August; only one frog was observed clinging to the side with its head out of water; there had been no rain that day.) The female was larger than the males present. Between 9 and 17 August there was no calling and little activity in the pool. As many as four males were observed on occasion, but appeared to be much shyer and quickly dived away. On the morning of 17 August (0530 hrs), another frog was found climbing the tree towards the pool. On the 18th, after several days of light rain, soft calling was heard at 2000 hrs. The following day they also called for several hours during the day. It was raining lightly. At this point our observations came to an end.

CONCLUSIONS

It should be noted, with regard to the conservation aims of this project, that there are many difficulties associated with assessing the status of many of the species found. Few recent reviews are available (but see Inger and Dutta 1987), and many reports are scattered in the literature and are not readily available. However, at least some of the species found here appear to be rare on a national and global scale (Dodd 1987). Given the adverse conditions encountered, it is certain that the faunal list we have compiled represents only a fraction of the species present in the Reserve Forest. Many of the species are restricted to areas of moist tropical forest and are threatened by habitat destruction. Apart from a few species exploited by man (e.g. the monitor lizard), conservation of these animals is bound up with conservation of their habitat. We therefore applaud the decision of the Government of Tamil Nadu to declare the Srivilliputtur Reserve Forest a Wildlife Sanctuary.

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REFERENCES

- DANIEL, J.C. (1963): Field Guide to the Amphibians of Western India, Parts 1 & 2. *J. Bombay nat. Hist. Soc.* 60: 415-438, 690-702.
- DANIEL, J.C. (1975): Field Guide to the Amphibians of Western India, Part 3. *ibid.* 72: 38-54.
- DODD, C.K., JR. (1987): Status, conservation and manage-

- ment. In: Snakes: Ecology and Evolutionary Biology. Eds. Siegel, Collins & Novak. Macmillan & Co. Ltd.
- INGER, R.F. & DUTTA, S.K. (1987): An overview of the Amphibian fauna of India. *J. Bombay nat. Hist. Soc.* (Centenary Supplement): 135-146
- INGER, R.F., SCHAEFFER, H.B., KOSHY, M.V. & BADKE, R. (1984): A Report on a collection of Amphibians and Reptiles from the Ponnudi, Kerala, South India. *J. Bombay nat. Hist. Soc.* 81: 406-427, 551-570.
- JOHNSINGH, A.J.T. (1984): Megamalai Wildlife Sanctuary. *Hornbill* 1984(1): 23-27.
- LOHOFNER, R. & WOLFE, J. (1984): A 'new' live trap and a comparison with a pitfall trap. *Herpetological review* 15(1): 25-26.
- MALHOTRA, A., DAVIS, K.K.D., SCOONES, T. & WOODROFFE, R. (1988): India 1987, The Final Report of the Oxford University Herpetological Expedition to South India 1987. Unpublished report.
- MURTHY, T.S.N. (1985): A Field Guide to the Lizards of the Western Ghats. *Records Zool. Surv. India*. Misc. pap. No. 72:1-51.
- SMITH, M.A. (1935): Fauna of British India, Reptilia and Amphibia. Vol. II - Sauria. Taylor & Francis, London.
- SMITH, M.A. (1943): *ibid.* vol. III - Serpentes. Taylor & Francis, London.